

in census tract 116.10 in Davison Township to 39.3 in census tract 1271 in Independence Township (Table 4-3). These compare to values of 36.7 for Oakland County, 35.0 for Genesee County and 35.5 for the state. There were 134,959 persons 65 years of age or older in Oakland County and 50,607 in Genesee County in 2000. The census tract with the highest percentage of persons 65 years of age or older is 134.02 in Atlas Township (115 individuals). Census tract 1231 in Groveland Township has the lowest percentage of persons 65 years of age or older at 4.9 percent (153 individuals). The estimated year 2000 median income is high throughout the corridor, compared to the Detroit Metropolitan Statistical Area, the multi-county planning area (Lapeer, Macomb, Monroe, Oakland, St. Clair, and Wayne counties) used by the census to compare data with other areas. The estimated 2000 median family income for the Detroit MSA was \$63,200. Median family Income in the census tracts bordering the corridor ranged from \$69,000 to \$110,000. The percent of dwelling units that are owner-occupied is also high. Apart from some apartment development in Ortonville (census tract 1229) and a concentration of apartments in the northwest area of census tract 116.10 in Davison Township, the level of ownership is very high. All the relocations for the project are single-family dwellings.

**Table 4-3
Key Population Characteristics**

Township	1990 Census Tracts	Est. 2000 Median Income in 1990 Tracts¹	2000 Census Tracts	2000 Median Age	2000 Population Age 65 and Older (percent)	2000 Percent Dwelling Units Owner Occupied
Independence	1271	\$109,923	1271	39.3	7.35	98%
Brandon	1221	\$69,317	NA	NA	NA	NA
Brandon	NA	NA	1227	35.9	7.1%	93%
Brandon	NA	NA	1229	34.5	6.3%	76%
Groveland	1230	\$79,537	NA	NA	NA	NA
Groveland	NA	NA	1231	38.8	4.9%	97%
Atlas	134	\$71,528	NA	NA	NA	NA
Atlas	NA	NA	134.01	37.6	6.4%	96%
Atlas	NA	NA	134.02	34.7	9.3%	85%
Davison	116	\$70,163	NA	NA	NA	NA
Davison	NA	NA	116.01	38.2	8.6%	95%
Davison	NA	NA	116.10	30.8	6.8%	56%

Source: 1990 and 2000 U.S. Census and Federal Financial Institutions Examination Council (FFIEC)

¹ 2000 Census data on income are not currently available. FFIEC data were used.

Census tract data for 2000 indicate that the highest percent minority area is census tract 116.10 in Davison Township at 3.7 percent (Table 4-4). The makeup of the minority population is complex, with no distinct patterns. The 2000 census offers many more options for racial identification than previous censuses, and many who filled out their forms have selected multiracial categories. In census tract 116.10, for example, individuals responded to 14 different categories. The top three racial categories in the corridor census tracts are noted in Table 4-4.

They represent a mix of Asian alone, Black or African American alone, White/Asian, American Indian or Alaskan Native (ANIA) alone, ANAI/White.

The census tract with the highest percentage of low-income persons was tract 1230 in Groveland Township with 5.4 percent. The state average is higher at 13.1 percent. (Note that low-income data are from the 1990 census. Data for 2000 has not been released).

Table 4-4
Minority and Low-Income Populations in Corridor Census Tracts

Township	1990 Census Tracts	Percent Low- Income (1990 data)¹	2000 Census Tracts	Percent Minority (2000 data)	Top Three Races (2000 data)²
Independence	1271	1.0	1271	2.2	A, B, W/A
Brandon	1221	3.9	NA	NA	NA
Brandon	NA	NA	1227	0.9	W/AIAN, B, A
Brandon	NA	NA	1229	0.7	AIAN, A, W/AIAN
Groveland	1230	5.4	NA	NA	NA
Groveland	NA	NA	1231	1.4	A, W/A, B
Atlas	134	4.7	NA	NA	NA
Atlas	NA	NA	134.01	1.4	A, B, W/AIAN
Atlas	NA	NA	134.02	1.0	A, B, W/A
Davison	116	2.7	NA	NA	NA
Davison	NA	NA	116.01	1.4	W/AIAN, AIAN, A
Davison	NA	NA	116.10	3.7	A, W/AIAN, W/A

Source: 1990 and 2000 U.S. Census

¹ 2000 Census data on income are not currently available.

² A = Asian alone; B = Black or African American; W = White; AIAN = American Indian or Alaskan Native.

A “/” means two races were identified by the individual filling out the census form.

4.3 Environmental Justice

The purpose of Executive Order 12898 is to identify, address, and avoid disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. The proposed improvements will not cause disproportionately high and adverse human health or environmental effects on minority populations or low-income populations.

MDOT conducted a visual analysis of the project area and reviewed pertinent census data. Six rounds of public information meetings were conducted to solicit input from potentially affected property owners. An examination of right-of-way / relocation data found no impacts on minorities or low-income populations. The homes subject to relocation may be characterized as middle-class or higher income, based on property values. Taken together this information indicates there will be no disproportionate impacts to minorities, low-income, or other people with special transportation needs in the project area.

While there are no environmental justice issues associated with the proposed project at this time, a continuing effort will be made to identify any disproportionately high and adverse impacts to minority populations and low-income populations during subsequent phases of this project. If such impacts are identified, every effort will be made to actively involve these populations in the project development process, and to avoid or mitigate these impacts.

4.4 Economic Impacts and Tax Base Loss

4.4.1 Economic Background

Economic activity in the project area is generated by a variety of market sectors including retail trade, services, education, and public administration. The corridor has been subject to rapid development. This trend is expected to continue.

Because of the enormity of the job base in Oakland County, its growth, in particular, has driven the residential development evident in the corridor. This growth has expressed itself in higher property costs. For example, an examination of the State Equalized Value (SEV) of ten homes fronting onto M-15 in Atlas Township found the SEV increased 45 percent from 1980 to 1990 and another 125 percent from 1990 to 2000. Between 1990 and 2000 employment in Oakland County grew 34 percent. In Genesee County it grew 14 percent. A view of the tax base change in corridor townships over the last decade indicates that in Brandon, Groveland, Atlas, and Davison Townships, the growth in the last ten years exceeds 250 percent (Table 4-5).

Table 4-5
Change in State Equalized Value – Corridor Townships
(1,000s of 2001 dollars)

	1990	1995	2000	Growth	
				1990 to 2000	1995 to 2000
Independence	\$ 491,763	\$ 707,024	\$ 1,240,082	252%	175%
Brandon	\$ 161,695	\$ 247,394	\$ 442,163	273%	179%
Groveland	\$ 84,300	\$ 128,980	\$ 212,878	253%	165%
Atlas	\$ 87,017	\$ 138,863	\$ 257,953	296%	186%
Davison	\$ 161,751	\$ 240,154	\$ 391,593	242%	163%
Total	\$ 986,526	\$ 1,462,415	\$ 2,544,669	258%	174%

Source: Oakland and Genesee County Tax Equalization offices.

M-15 has access to land suitable for residential development, which has led to today's congestion and continued predictions of population and traffic growth. Adding capacity to M-15 is a response to the growth that has already occurred and anticipates the growth predicted by the local political jurisdictions in the corridor.

4.4.2 Tax Base Loss

Property acquisition will result in a reduction in real property tax revenues of about \$362,000, based on the right-of-way cost estimate (Table 4-6). This represents only 0.014 percent of the property taxes collected by the townships and villages in the corridor. The largest effect would be on Ortonville. The increase in SEV of the remaining properties over the coming years will outweigh potential losses, with the possible exception of Ortonville. And, many of the businesses and, perhaps the residents to be relocated, are likely to relocate within the corridor, minimizing tax loss.

**Table 4-6
Tax Base Loss (2000 dollars)**

Taxing Entity	ROW Cost¹	Value²	2000 Tax Rate	Tax Loss³	Percent of Total Taxes⁴
Independence Township				\$ 44,678	0.00%
Owner Occupied DU	\$ 2,835,655	\$ 1,417,828	0.0291	\$ 41,191	
Other	\$ 149,245	\$ 74,623	0.0467	\$ 3,486	
Brandon Township				\$ 40,919	0.01%
Owner Occupied DU	\$ 164,550	\$ 82,275	0.0343	\$ 2,825	
Other	\$ 1,480,950	\$ 740,475	0.0514	\$ 38,094	
Groveland Township				\$ 14,924	0.01%
Owner Occupied DU	\$ 70,285	\$ 35,143	0.0271	\$ 951	
Other	\$ 632,565	\$ 316,283	0.0442	\$ 13,972	
Atlas Township				\$ 14,142	0.01%
Owner Occupied DU	\$ 699,210	\$ 349,605	0.0346	\$ 12,098	
Other	\$ 77,690	\$ 38,845	0.0526	\$ 2,044	
Davison Township				\$ 9,654	0.00%
Owner Occupied DU	\$ 599,213	\$ 299,606	0.0297	\$ 8,902	
Other	\$ 31,538	\$ 15,769	0.0477	\$ 751	
Village of Goodrich				\$ 54,962	0.15%
Owner Occupied DU	\$ 92,013	\$ 46,006	0.0426	\$ 1,960	
Other	\$ 1,748,238	\$ 874,119	0.0606	\$ 53,002	
Village of Ortonville				\$ 183,131	0.47%
Owner Occupied DU	\$ 0	\$ 0	0.0423	\$ 0	
Other	\$ 6,161,300	\$ 3,080,650	0.0594	\$ 183,131	
Total	\$ 14,742,450	\$ 7,371,225		\$ 362,414	0.01%

Source: Tax Equalization Offices

¹ Fair market value of the land and structures required for right-of-way.

² This is 50% of the estimated "fair market value."

³ Value times tax rate, then rounded.

⁴ Tax loss divided by total State Equivalent Value

4.5 Land Use and Zoning

Land use along M-15 in Oakland County, is predominately single-family residential with lot sizes ranging from one to 2.4 acres in the south, 2.5 to 4.9 acres in the central section and up to 10 acres (sometimes more) in the north (Figure 4-3). Commercial and industrial zoning on M-15 is located around Ortonville and the southern corridor boundary (Figure 4-4). Sewers do not serve Northern Oakland County along M-15, which now limits the density of development.

In Genesee County land use along M-15 is mostly residential. Lack of sewers is also a constraint. Commercial zoning is located at the northern boundary of the corridor and in Goodrich. Goodrich also has light industrial zoning.

Within one mile of M-15 there is also land zoned for recreation/conservation and residential/agricultural uses. Many wetlands and small lakes lie in the corridor in both counties.

The study area has grown rapidly (Tables 1-1 and 4-2) and growth is expected to continue. Residential growth takes the form both of subdivision development and splits of existing lots. A substantial amount of vacant land planned for residential use remains in the corridor. SEMCOG forecasts the townships in the Oakland County portion of the corridor will be urbanized by 2010.

4.6 Farmland/Michigan Act 233 Lands/Forest Land

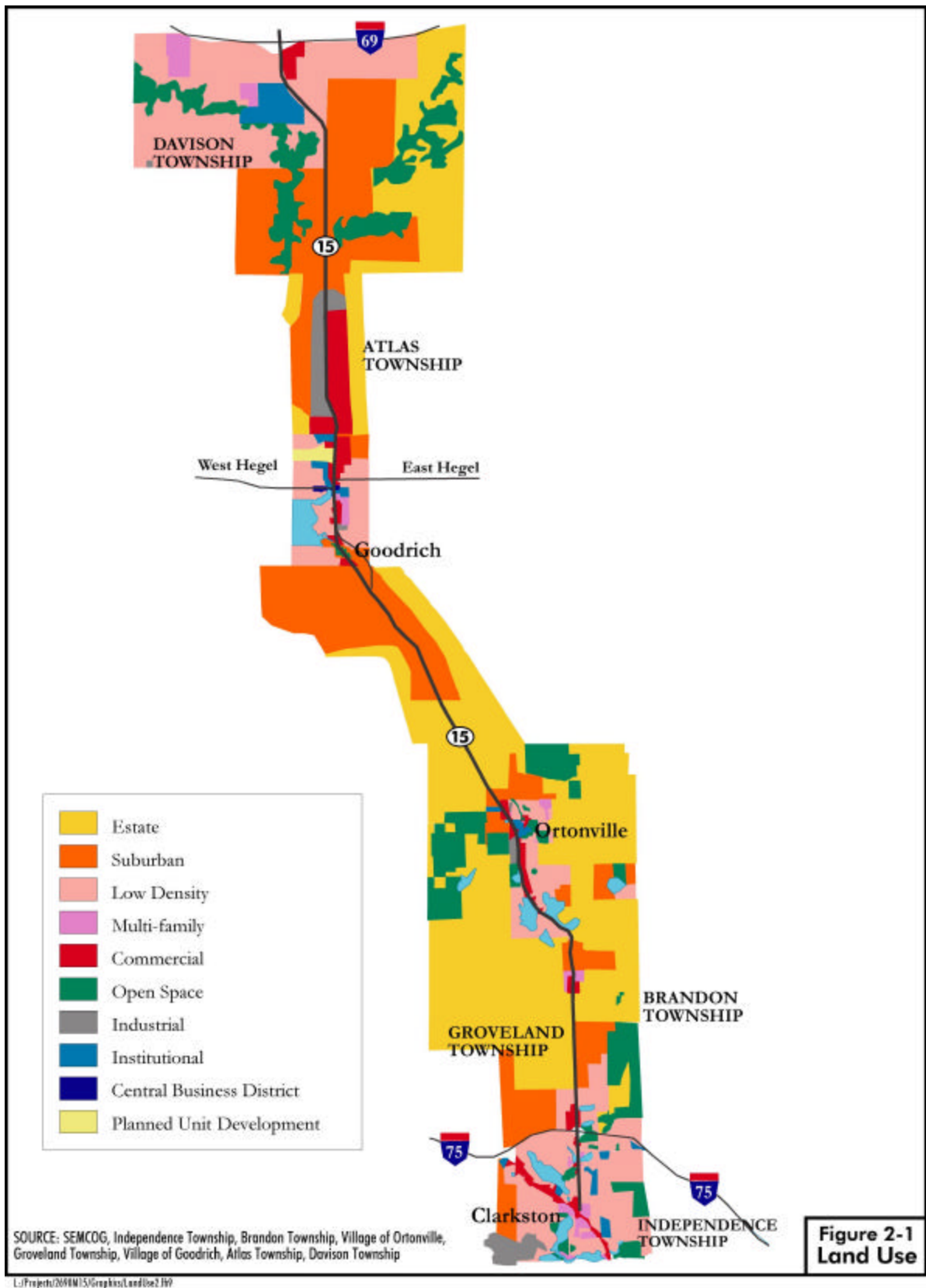
There is no agriculture or forestry zoning adjacent to the proposed project. There is land under cultivation north of Hill Road. It is zoned residential agriculture and the future land use map shows it as suburban. No coordination with the U. S. Department of Agriculture or the Natural Resources Conservation Service is required because no prime farmlands or forest lands will be affected. No Michigan Public Act 233 (The Farmland and Open Space Preservation Act) parcels are adjacent to M-15 in the project area.¹³ Based on zoning, additional review under the Federal Farmland Protection Policy Act was not required, therefore, an A.D. 1006 form was not prepared and coordinated with the USDA/NRCS.

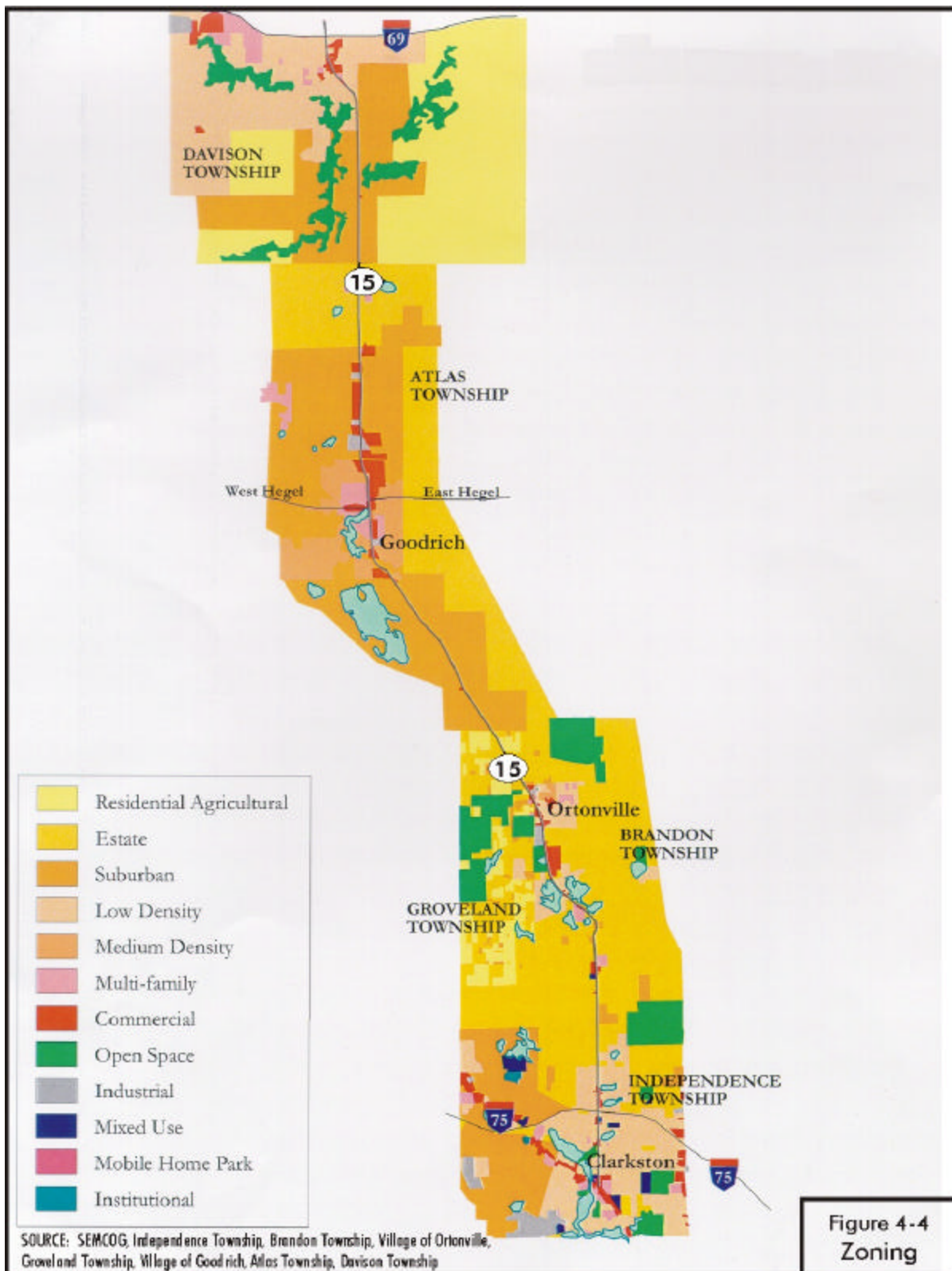
4.7 Air Quality Analysis

Effective April 6, 1995, the seven-county Detroit-Ann Arbor area (including Oakland County) was redesignated by the U.S. Environmental Protection Agency to attainment and associated section 175A maintenance of the National Ambient Air Quality Standard (NAAQS) for ozone. Effective January 16, 2001 EPA also approved the redesignation of Genesee, Bay, Midland, and Saginaw counties to attainment for the 1-hour NAAQS ozone standard. EPA also approved the state's plan for maintaining the 1-hour ozone standard for the next ten years as a revision to the Michigan State Implementation Plan (SIP).

These designations mean that, for the time being, both Oakland and Genesee counties are considered in attainment of the ozone standard. However, a new EPA 8-hour standard, which has been held in abeyance for some time, may be implemented soon.

¹³ Based on a search of the Act 233 database for Oakland and Genesee counties provided by Rich Harlow of the Michigan Department of Agriculture, Farmland and Open Space Preservation, Environmental Stewardship Division, May 14, 2001.





Based on the above discussion, and in accordance with Michigan Department of Transportation (MDOT), Federal Highway Administration (FHWA), and U.S EPA procedures, the air quality impact analysis for this project consisted of a microscale analysis of carbon monoxide (CO) concentrations.¹⁴ The criteria for adverse impact is an exceedance of the National Ambient Air Quality Standards (NAAQS) for CO at a sensitive receptor modeled for the year of opening (2010) and design year (2025).

The results of the analysis are found in Appendix E. The worst-case one-hour CO concentration in 2010, the earliest year of project opening, is estimated to be 3.3 parts per million (ppm), well below the NAAQS of 35 ppm. Converting this to an eight-hour value using a persistency of 0.6 results in an eight-hour forecast of 2.8 compared to the standard of 9 ppm. One- and eight-hour concentrations in 2025 are estimated to be 3.2 and 2.7 ppm, respectively. This project is expected to have a positive impact on air quality by reducing congestion.

4.8 Noise Analysis

As a rule, doubling the energy of sound (twice as much traffic, half as much distance) results in about a 3 dBA sound level increase, a level undetectable by most people unless they are in a controlled laboratory setting. Thus, noticeable noise impacts typically result when the road is moved much closer to sensitive receptors.

The FHWA has established a noise guideline of 67 decibels (dBA), measured as an “average” of sound over a one-hour period (referred to as L_{Aeq1h}). This level is not to be “approached or exceeded” at the exterior of residences, churches, hospitals, parks and libraries. Should the guideline at these sensitive receptors be approached or exceeded, noise abatement measures must be considered. “Approach” is defined in Michigan as 1 dBA, so the effective criterion is 66 dBA for consideration of mitigation. Noise mitigation must also be considered if a project results in a substantial increase (10 dBA or more) in noise levels.

The frontage of M-15 is mostly residential with some commercial uses. The 66 dBA criterion applies through the residential areas of the corridor. Noise modeling for the project found that many homes are exposed to noise levels exceeding abatement criteria today and more will be in the future as traffic volumes grow.

The Transportation Noise Model (TNM1.1) available through FHWA was used to predict noise levels based on roadway geometry, the location of sensitive receptors, and traffic information such as speed and the mix of vehicles.¹⁵ To apply this, the corridor was divided into sections that have consistent roadway geometry and traffic. A “critical distance” was established using the TNM for each section. This is the distance from the center line of the road to the point where the projected noise level would drop below 66 dBA. Applying these distances to aerial mapping allowed a determination of how many homes would fall within the critical distance under 2025 build and no-build conditions (Appendix F). The result of this analysis found that 145 houses would be exposed to noise levels exceeding the 66 dBA criterion under future no-build conditions compared to 175 homes with the proposed project. Future traffic would be closer to residences with the wider typical section of the proposed road, so the number of affected residences would be expected to be higher. The number of homes affected by the project would be higher yet,

¹⁴ “Air Quality Technical Memorandum,” The Corradino Group, November 2001.

¹⁵ “Noise Study Report,” The Corradino Group, November 2000.

except that some of the houses affected under no-build conditions would be subject to relocation under the proposed action.

The test of whether noise mitigation should be pursued rests on whether such mitigation is “reasonable” and “feasible.” The “reasonable” test addresses whether noise mitigation makes sense. The “feasible” test relates to whether a measure is physically or institutionally possible.

A number of potential mitigation measures may be considered to reduce noises levels. These include lowering the roadway profile, prohibiting truck traffic, reducing traffic speeds, and constructing noise barriers. Lowering the roadway profile makes driveway access difficult in areas like the M-15 corridor, where much of the corridor is lined with single-family use or commercial nodes with direct driveway connections. Lowering the road may also require more right-of-way. For these reasons, lowering the roadway profile is not considered feasible or reasonable.

Prohibiting truck traffic is not feasible because M-15 is a state trunkline. It is specifically designed to accommodate commercial traffic. Similarly, lowering the speed limits along M-15 for noise reduction runs counter to the purpose of moving people and goods in an efficient manner over the state highway system. M-15 already has a number of speed restrictions that are reflected in the noise modeling. Because M-15 is a state trunkline, MDOT is committed to maintaining speeds limits that allow safe and efficient travel, which means maintaining a 55 mph speed limit where possible.

Noise barriers consist of earthen berms or walls, or combinations of the two. Unless right-of-way is available for berms, noise walls are normally the mitigation technique of choice. Berms are cost-effective and can substantially reduce noise levels. However, they take up a lot of space. In the M-15 corridor such space does not exist. Right-of-way is not available for berms without additional relocations, historic impacts, and wetland impacts, so noise walls were evaluated.

In most cases noise walls are feasible unless they become so tall that wind loads become an engineering concern, so feasibility is generally not an issue. However, for M-15, reasonableness is difficult to achieve. Homes are not sufficiently dense to meet the reasonable test, which is based on a cost per dwelling unit protected (6 dBA reduction or more). In addition, experience indicates that noise barriers are not effective when they have gaps. Along most of M-15 gaps would have to be left in any noise barrier for driveway access. Finally, the general reaction to walls in front yards is often negative. For these reasons construction of berms and/or noise walls along M-15 is not considered reasonable at any location along the project and no noise mitigation is recommended.

4.9 Threatened and Endangered Species

Threatened and endangered species are officially protected in Michigan by both federal and state Endangered Species Acts: Public Law 93-205 and Act 203 of the Public Acts of 1974, respectively. An endangered species (E) under the acts is defined as in danger of extinction throughout all or a significant portion of its range. A threatened species (T) under the acts is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Special concern species (SC) are not afforded legal protection under the acts. They are species with declining or relict populations in Michigan or are species for which more information is needed.

In response to scoping, the U.S. Fish and Wildlife Service did not find any federally-listed species as endangered or threatened, or species proposed for listing (see letter dated October 26, 2000, Appendix C, Section 2). The Michigan Natural Features Inventory (MNFI) is the most complete database available for all of Michigan's T/E/SC species. According to the Michigan Department of Natural Resources (MDNR), Wildlife Division, the Eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*) has been known to occur near the project area (see letter dated October 31, 2000, Appendix C, Section 2). This species is a candidate for federal listing, and in Michigan is a species of special concern. Subsequent correspondence from the MDNR expanded on information from the MNFI (see letter dated April 17, 2001, Appendix C, Section 2), adding the poweshiek skipper (*Oarisma powesheik*), a butterfly, which is state threatened; and, the blazing star borer (*Papaipema beeriana*), an insect, which is of state special concern. None of these species were found, although habitat was found for the rattlesnake.

Biological surveys were conducted August 14 to 18, 2000 and May 14 to 18, 2001 (Appendix G).¹⁶ The investigations covered a linear strip on either side of the existing highway of 200 feet for plants and up to 500 feet for animals and their habitat. Urban areas, suburban yards, and actively farmed areas were not investigated. No federal threatened or endangered species were found in either field effort. However, 436 plant species, 67 species of birds, 14 mammal species, one fish species, 14 species of amphibians or reptiles, two species of mollusks, and 20 species of insects were observed within the study area in an effort that covered 72 sites. (Note that the biological inventory was performed separate from the wetland analysis and so the inventory numbers on Figure 1-3 are distinct).

One state-listed threatened species, the spotted turtle, was found, as were, three state-listed species of special concern, the wahoo (a plant), the red mulberry (a tree) and Blandings turtle. Habitat for eight other state-listed species is present. In terms of effects, a very small section of Site 28 (0.05 acres), which contains the wahoo will be affected. Sections of Sites 47 and 48 will be affected, but the preferred habitat for the spotted turtle at both sites is distant from the road and would not likely be affected. Other sites where species were found will be avoided.

4.10 Waterways/Water Quality/Floodplains

4.10.1 Waterways

Improvements to M-15 will impact 18 different waterways and waterbodies including lakes, ponds, perennial streams, intermittent streams, and drains. One lake could be directly affected by improvements to M-15. The existing right-of-way for M-15 encroaches on Huff Lake. The right-of-way is 120 feet at this location. Here, M-15 is proposed to be widened to five-lanes within the existing right-of-way. The pavement at this location would be widened but still would not touch Huff Lake. An unnamed stream that connects Huff Lake with Wilson Lake would be crossed at this location as it is with the existing M-15. This is one of six unnamed intermittent streams that M-15 crosses today and would cross with future widening.

Named perennial streams would be crossed four times by an improved M-15. The streams that would be crossed are Duck Creek, which would be crossed three times, and Kearsley Creek.

¹⁶ "Threatened and Endangered Species Investigation Report," V3 Consultants, November 2001.

Kearsley Creek is a designated trout stream. All future crossings would be at the same locations as today's. At Kearsley Creek the future road would be narrowed to minimize impacts.

Two ponds and five drains would also be affected by M-15. The existing road already crosses the five drains. M-15 would encroach into the sides of the two ponds.

4.10.2 Water Quality

Through early coordination, the Michigan Department of Environmental Quality has indicated that discharge from storm water sewers into open water is discouraged. MDOT and MDEQ agree that filtration through vegetation, rather than the use of detention basins, is preferred and MDEQ has indicated that sheet flow was preferable to storm sewers (Appendix C - minutes of September 22, 2000 Scoping Meeting in Lansing). From a design point of view, the most challenging situation is where wetlands occur on both sides of the road. Here, water must be carried off the length of the roadway between the wetlands to a point where it can be filtered through sheet flow. There must be sufficient elevation of the roadbed to accomplish this. On the other hand, the elevation of the roadbed should be as low as possible to minimize the footprint of impacts in these very wetlands. These tradeoffs have been addressed in the engineering supporting this document and will be further pursued during design.

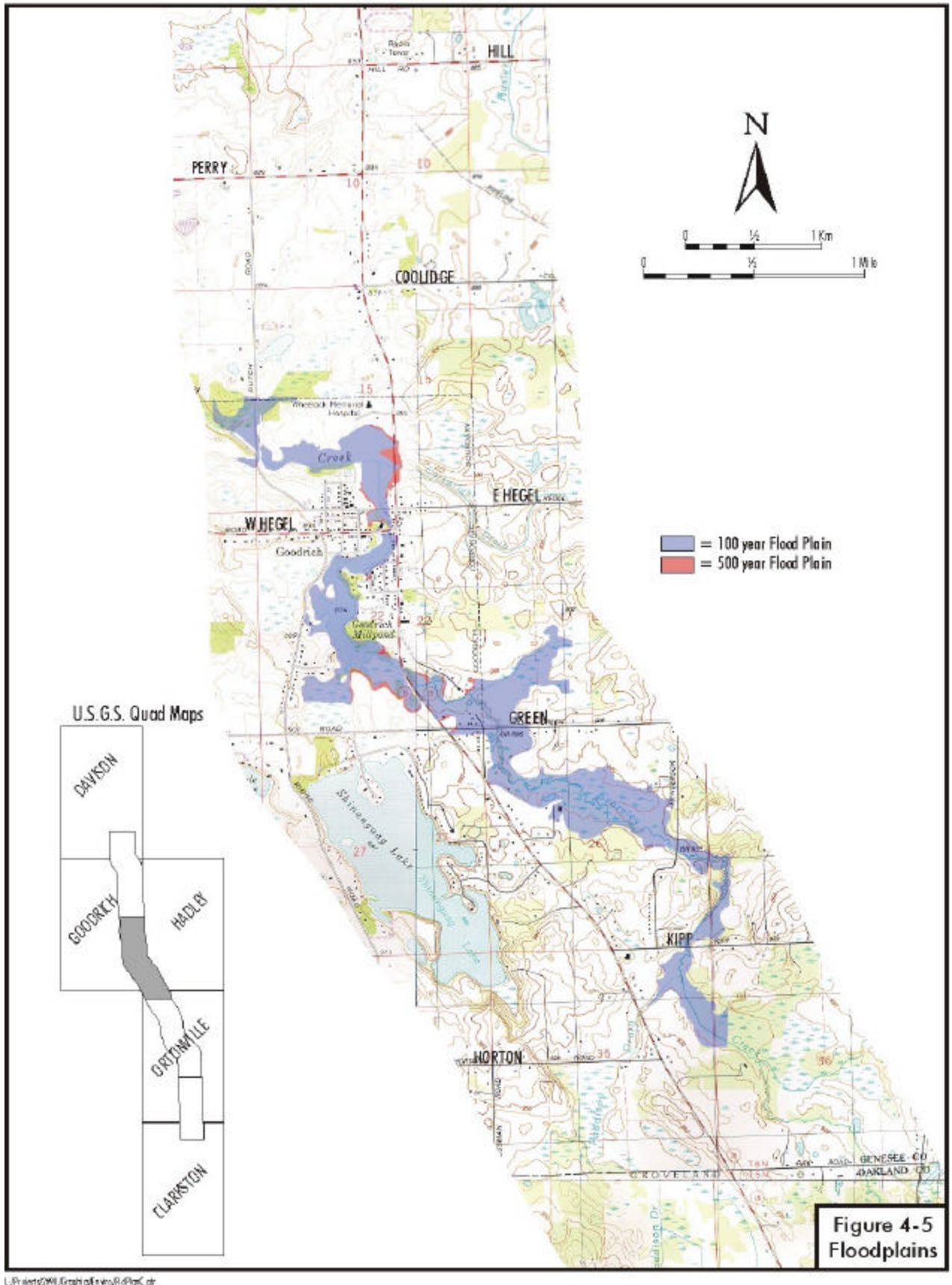
4.10.3 Floodways and Floodplains

There will be no encroachment on any regulatory **floodway** (the main channel that carries water) in Oakland or Genesee County. **Floodplain** (the area into which water extends during periods of flooding) would be affected. This has been determined through an analysis performed consistent with 23 CFR 650 and Executive Order 11998. Floodplain analysis must examine whether a project creates or increases a hazard to people and/or property, and whether there is an impact on natural and beneficial floodplain values. These values include: fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.

All new structures associated with M-15 will have effective capacities such that backwater surface elevations are not expected to significantly increase. Structures will be designed to prevent the base floodplain elevation from rising more than 1/10 of a foot. Thus, no significant hazard to people or property is expected to result from the project.

In Oakland County there will be no floodway fringe (i.e., 100-year floodplain) affected in Independence Township. Brandon Township has just enrolled in floodplain mapping activities and no maps are available.

In Genesee County the only floodplain affected is in the Goodrich area (Figure 45). The floodplain will be encroached upon in two places; Kearsley Creek at the south end of Goodrich and Cartwright Drain at the north end of Goodrich. Existing M-15 already crosses the floodplain at Kearsley Creek. The right-of-way for the improved M-15 will be kept at a minimum at this location, such that the additional floodplain encroachment would amount to approximately 0.16 acres. The west side of a widened M-15 would encroach on the 100-year floodplain at Cartwright Drain (about 0.04 acres).



The encroachment at Kearsley Creak would result in an adverse impact on natural and beneficial floodplain values that are associated with those wetlands that occupy the base floodplain at this location. The values and functions of these wetlands and the impact that the proposed project will have upon them are described in the next section.

An analysis of these wetland impacts indicates that the project should not result in a substantial loss in natural and beneficial floodplain values if measures to minimize the project's impact on these wetlands and to restore their flood control values are incorporated into the project's design.

4.11 Wetlands

Fieldwork to identify wetlands was performed consistent with state and federal guidance along the M-15 corridor in the fall of 2000 and in the spring of 2001 (Table 4-7). State and federal laws and regulations (Federal Executive Order 11990 and of Part 303 of Michigan Public Act 451 of 1994) protect wetlands and require that: 1) they be avoided to the extent feasible and prudent; 2) if unavoidable, impacts be minimized; and, 3) mitigation be provided in the form of wetland replacement, generally as close as possible to, and in the same watershed as, the impact area.

When Practical Alternatives were developed, avoidance was a primary consideration. Wetland protection was carefully balanced with possible impacts on cultural resources considered to be potentially eligible for the *National Register of Historic Places*. A preliminary assignment of wetland priority guided this process (see column 3 in Table 4-7). The Preferred Alternative was created section-by-section to minimize wetland impacts. Where avoidance was impossible, a minimal footprint was pursued by narrowing the median where there are few or no access needs. Additionally, where the road is adjacent to wetlands, the standard ditch may be modified to further minimize wetland intrusion. The incline to the waterline/wetland will be steeper than normal, and a guard rail will be installed at the edge of the roadway's shoulder.

Fifty-two wetlands are within the proposed highway right-of-way. Eighteen include at least some forested wetland communities, 42 contain some emergent communities, 13 contain scrub-shrub communities, and 17 contain open water. (There is overlap in these categories among the 52 wetlands.) All these wetlands provide wildlife habitat, water storage capacity, water quality improvement, and aesthetic enhancement to the surrounding communities. In addition, the impacted wetlands are embedded in a landscape experiencing mounting development pressures, increasing their potential future value to society.

The preliminary determination has been made that, based on the criteria outlined in Part 303, Wetland Protection, of the Natural Resources and Environmental Protection Act of 1994 (1994 P.A. 451, as amended), 41 of the 52 wetlands in the proposed highway right-of-way are regulated. Final regulatory determination and authority, however, rests with the MDEQ. Any dredging, filling, or construction in regulated wetlands requires an MDEQ permit before beginning the construction activity. To be successful, a permit applicant must demonstrate that the activity is dependent on being located in the wetland, and/or no feasible or prudent alternative exist which would avoid or minimize the proposed wetland impact. In general, the MDEQ considers the magnitude and justification of the impact in granting a permit. The permit may require compensatory mitigation, which is the creation of wetland from upland to replace the affected

**Table 4-7
Summary of Wetland Characteristics**

Wetland ID	Figure Number	Priority¹ Class	Roadway Type	Wetland Community Classification²	MDEQ Regulated?³	Total Acres Impact	Percent PFO or Lake Fringe	Lake Fringe or PFO Impact (Acres)	POW/PSS/PEM Impact (Acres)	Description
W68	1-3d	3	5-lane	PEM	N	0.01	0	0.00	0.01	Cattail, elm, aster; organic muck soils with some recent mineral soil deposition
W67	1-3d	2	5-lane	PEM	N	0.16	0	0.00	0.16	Cattail, few elm, lake fringe; gray mineral soils with bright mottles
W65	1-3d	3	5-lane	POW/PEM	Y	0.02	0	0.00	0.02	Hoyle Drain; cattail, boxelder, reed canary grass, blue vervain, duck weed; organic muck soils.
W64	1-3d	3	5-lane	POW/PEM	Y	0.01	0	0.00	0.01	Hoyle Drain; cattail, boxelder, reed canary grass, blue vervain, duck weed; organic muck soils.
W63	1-3d	2	5-lane	PFO/POW	Y	0.09	80	0.07	0.02	Cummings Drain, floodplain, Carex sp., inundated, loamy grayish soil with bright mottles, mineral sediment, some muck soils on east side.
W61	1-3d	3	5-lane	PEM/PSS	Y	0.33	0	0.00	0.33	Cattails, phragmites, elm, elder, gray dogwood; organic soils
W60	1-3d	1	5-lane	POW/PFO	Y	0.74	70	0.52	0.22	Cummings Drain, ash, cottonwood, silver maple; organic soils
W59	1-3d	3	Narrow blvd	PEM/PSS	Y	0.21	0	0.00	0.21	Drain w/cattails, dogwood; organic muck soils
W58	1-3d	3	Narrow blvd	POW/PFO	Y	0.60	70	0.42	0.18	Cummings Drain, silver maple, cottonwood; organic muck soils
W57	1-3d	2	Narrow blvd	PEM	Y	0.21	10	0.02	0.19	Drain with cattails, willows, ash; mucky sands
W56	1-3d	3	Narrow blvd	PEM/PSS	Y	0.22	5	0.01	0.21	Cattail, dogwood, willow; grayish mineral soils with bright mottles

Note: footnotes at end of table.

**Table 4-7
Summary of Wetland Characteristics (Continued)**

Wetland ID	Figure Number	Priority¹ Class	Roadway Type	Wetland Community Classification²	MDEQ Regulated?³	Total Acres Impact	Percent PFO or Lake Fringe	Lake Fringe or PFO Impact (Acres)	POW/PSS/PEM Impact (Acres)	Description
W55	1-3d	2	Narrow blvd	PFO/PEM	N	0.20	90	0.18	0.02	Green ash, elm, 6" water marks, buttressed roots, organic muck soils
W54	1- 3d	2	Narrow blvd	PFO/PEM	N	0.13	40	0.05	0.08	Elm, reed canary grass; grayish loam soils with bright mottles
W53	1- 3c	3	Narrow blvd	PEM	N	0.10	5	0.01	0.10	Cattails; organic muck soils
W52	1- 3c	3	Narrow blvd	PEM/PFO	N	0.18	25	0.05	0.14	Cottonwood, ash, phragmites, reed canary grass, typha; mucky loam soils
W51	1- 3c	3	Narrow blvd	PEM	N	0.02	0	0.00	0.02	Open water and reed canary grass associated with drain; grayish loamy soils with bright mottles
W50	1- 3c	2	Narrow blvd	PEM/POW	Y	0.02	5	0.00	0.02	Reed canary grass, Cartwright Drain; inundation
W49	1- 3c	2	Narrow blvd	PEM/POW	Y	0.02	5	0.00	0.02	Reed canary grass, Cartwright Drain; inundation
W48	1- 3c	1	5-lane	PEM/PSS/PFO	Y	0.50	10	0.05	0.45	Cattails, sedges, red osier dogwood, black ash; organic muck soils, inundation, saturation
W47	1- 3c	1	5-lane	PFO/PEM	Y	0.30	60	0.18	0.12	Green ash, elm, water marks, buttressed roots, reed canary grass, organic muck soils
W44	1- 3c	1	5-lane	PFO/POW	Y	0.73	90	0.65	0.07	Elm, ash, cottonwood, skunk cabbage; associated with Kearsley Creek; muck soils
W43	1- 3c	2	Narrow blvd	PFO	N	0.03	50	0.01	0.01	Silver maple, cottonwood, cattails; organic muck soils
W42	1- 3c	3	Narrow blvd	PEM	N	0.06	0	0.00	0.06	Cattails; mucky sands

Note: footnotes at end of table.

**Table 4-7
Summary of Wetland Characteristics (Continued)**

Wetland ID	Figure Number	Priority¹	Roadway Type	Wetland Community Classification²	MDEQ Regulated³	Total Acres Impact	Percent PFO or Lake Fringe	Lake Fringe or PFO Impact (Acres)	POW/PSS/PEM Impact (Acres)	Description
W41.5	1-3c	3	Narrow blvd	POW/PEM/PSS	N	0.11	0	0.00	0.11	70% POW, 30% PEM, spike-rush, reed canary grass; grayish loam with bright mottles; possibly a detention basin for church parking
W41	1- 3c	3	Narrow blvd	POW/PEM	Y	0.01	0	0.00	0.01	Reed canary grass, tussock sedge; inundated (Paddison Drain)
W40	1- 3c	3	Narrow blvd	POW/PEM	Y	0.01	0	0.00	0.01	Reed canary grass, tussock sedge; inundated (Paddison Drain)
W38	1- 3c	2	Narrow blvd	PEM/PSS	Y	0.10	0	0.00	0.10	Reed canary grass, Grey dogwood, Spiraea alba; mucky loam (85% PEM)
W37	1- 3b	1	Very narrow blvd	PEM	Y	0.34	0	0.00	0.34	Includes "fen" species: pitcher plants, shrubby cinquefoil, spiraea, cattails; mucky peat soil (west side of M-15)
W36c	1- 3b	1	Very narrow blvd	PEM/PSS	Y	0.45	0	0.00	0.45	Includes "fen" species; northern half is reed canary grass/sedge meadow; southern half is fen with shrubby cinquefoil, twig rush; muck soils
W36b	1- 3b	1	Very narrow blvd	PEM/PSS	Y	0.47	0	0.00	0.47	PEM/PSS with fen species; shrubby cinquefoil, twig rush, spirea, tamarack; muck soil
W36a	1- 3b	1	Very narrow blvd	PFO/PSS/PEM	Y	0.53	20	0.11	0.43	Mixed community of green ash, willow, reed canary grass, sedges, red osier dogwood
W35	1- 3b	3	Very narrow blvd	PEM/POW	Y	1.60	0	0.00	1.60	70% PEM: cattails, reed canary grass; mucky sand soils; 30% POW
W34	1- 3b	2	Very narrow blvd	POW/PEM	Y	0.73	0	0.00	0.73	Pond with wetland; 95% POW, 5% PEM; reed canary grass; inundated

Note: footnotes at end of table.

**Table 4-7
Summary of Wetland Characteristics (Continued)**

Wetland ID	Figure Number	Priority¹	Roadway Type	Wetland Community Classification²	MDEQ Regulated?³	Total Acres Impact	Percent PFO or Lake Fringe	Lake Fringe or PFO Impact (Acres)	POW/PSS/PEM Impact (Acres)	Description
W33	1-3b	3	Narrow blvd	PEM/POW	Y	0.09	0	0.00	0.09	West side: Typha, Salix, Sambucus canadensis; East side next to school soccer field: POW, sensitive fern, reed canary grass, cattails; mucky sands, inundated
W32	1-3b	2	Narrow blvd	PEM	Y	0.13	0	0.00	0.13	Reed canary grass, cattail; organic soils
W31	1-3b	2	Narrow blvd	PEM/PSS	Y	0.27	0	0.00	0.27	Red osier dogwood, willow, cattail, sedges, organic soil
W30	1-3b	1	Narrow blvd	POW	Y	0.12	0	0.00	0.12	Duck Creek with little or no wetland fringe
W29	1-3b	1	Narrow blvd	PEM/POW	Y	0.37	0	0.00	0.37	Sedges, cattail wetland with Duck Creek; organic soils; inundated
W27	1-3b	1	Narrow blvd	PEM/PSS/PFO	Y	0.19	5	0.01	0.18	Wetlands with Duck Creek; 65% cattail PEM; 30% red osier dogwood PSS; 5% PFO with ash, cottonwood; organic soils.
W26	1-3b	1	Narrow blvd	PEM/PSS/PFO	Y	0.43	10	0.04	0.39	Reed canary grass, dogwood, ash wetland associated with Duck Creek
W25	1-3b	2	Narrow blvd	POW	Y	0.45	0	0.00	0.45	Duck Creek (channelized) no wetland fringe
W24	1-3b	2	5-lane	PFO/PEM	Y	0.10	100	0.10	0.00	Boxelder, ash, cottonwood, reed canary grass; mucky sand soils; Green Lake-lake-fringing wetland
W12	1-3b	3	5-lane	PEM	Y	0.90	0	0.00	0.90	Cattails, giant reed; organic soils
W10.5	1-3b	3	Narrow blvd	PEM	Y	0.08	0	0.00	0.08	Cattails; organic soils
W10	1-3b	3	Narrow blvd	PEM	Y	0.72	0	0.00	0.72	Cattails; organic soils

Note: footnotes at end of table.

**Table 4-7
Summary of Wetland Characteristics (Continued)**

Wetland ID	Figure Number	Priority¹ Class	Roadway Type	Wetland Community Classification²	MDEQ Regulated?³	Total Acres Impact	Percent PFO or Lake Fringe	Lake Fringe or PFO Impact (Acres)	POW/PSS/PEM Impact (Acres)	Description
W9	1-3b	3	Narrow blvd	PFO	N	0.05	100	0.05	0.00	Cottonwood, silver maple
W8	1-3b	2	Narrow blvd	PEM	Y	0.25	0	0.00	0.25	Cattail; mucky sand soils
W7	1-3b	2	Narrow blvd	PEM	Y	0.15	0	0.00	0.15	Cattail; mucky sand soils
W5	1-3b	2	Narrow blvd	PEM/PSS	Y	0.26	0	0.00	0.26	Dogwood, reed canary grass; mucky sand soils
W4	1-3b	1	Narrow blvd	PFO	Y	0.19	0	0.00	0.19	Black willow, silver maple green ash; grayish loam soils with bright mottles
W3	1-3b	1	Narrow blvd	PFO/PSS	Y	0.47	80	0.37	0.09	Cottonwood, silver maple, 20% PSS (dogwood); grayish loam soils with bright mottles
W2	1-3a	3	Narrow blvd	PFO/PEM	N	0.02	40	0.01	0.01	Elms, turf grasses; grayish loam soil with bright mottles
Total						14.48		2.91	11.57	

¹Priority classes applied to this project were: 1, highest quality; 2, medium quality; and 3, lowest quality.

²PEM – Palustrine emergent

³Preliminary determination. MDEQ will make final determination whether wetland is regulated or not. Y = yes, N = no.

PSS – Palustrine shrub-scrub

PFO – Palustrine forested

POW – Palustrine open-water

Note: All wetland impacts will be mitigated because of the use of federal funds (E.O. 11990).

Source: Tilton and Associates

acreage in a regulated wetland; usually 1.5 - 2 acres of wetland must be constructed for every acre impacted. Palustrine Forested (PFO) and lake fringe wetlands are commonly mitigated at a 2:1 ratio. Palustrine Emergent (PEM), Palustrine Open Water (POW), and Palustrine Shrub/Scrub (PSS) wetlands are usually mitigated at a 1.5 to 1 ratio.

The tentative conclusion is that approximately 13.4 acres of wetland are subject to mitigation, with a likely mitigation need of about 21.4 acres (Table 4-8).

Table 4-8
Summary of Estimated Impacts and Potential Compensatory Mitigation Requirements

Wetland Community Types	Estimated Impact (acres)	Probable Mitigation Ratio	Estimated Compensatory Mitigation (acres)
Regulated Wetlands (pending MDEQ confirmation)			
PFO + Lake Fringe	2.54	2:1	5.1
POW/PEM/PSS	10.86	1.5:1	16.3
Total	13.40		21.4
All Wetlands			
PFO + Lake Fringe	2.91	2:1	5.8
POW/PEM/PSS	11.57	1.5:1	17.4
Total	14.48		23.2

Source: Tilton and Associates

4.12 Historic and Archaeological Resources

The *National Register of Historic Places* has established criteria for determining historic significance. These criteria require a property to have integrity of location, design, setting, materials, workmanship, feeling, and association. Additionally, the property must be fifty years old or older, and meet one of the following criteria: a) be associated with a significant event; b) be associated with the lives of significant persons; c) embody the distinctive characteristics of a type, period or method of construction, or represent the work of a master; or, d) have yielded or may be likely to yield information important in history or prehistory (usually archaeological sites).

To satisfy Section 106 of the National Historic Preservation Act and Section 4(f) of the Department of Transportation Act, MDOT contacted the Michigan State Historic Preservation Office (SHPO) for help in identifying project area historic and archaeological sites. The SHPO recommended that MDOT conduct historic and archaeological surveys to locate sites eligible for listing on the *National Register of Historic Places*. The FHWA and MDOT began cultural resource surveys by delineating an Area of Potential Effect (APE) for the project. The APE represents the maximum area potentially affected, both directly and indirectly, by the project and is approved at the outset of the analysis by the State Historic Preservation Office (SHPO). The SHPO agreed the APE would extend one lot deep along most of M-15 except where the potential for a district was identified (see letters dated April 3 and June 26, 2001, Appendix C, Section 2).

Surveys of historic and archaeological resources took place within the APE in 2000 and 2001. The survey results, project impacts, and mitigation measures are described in separate reports.¹⁷ The SHPO concurred with the recommendations for *National Register* eligibility in those reports (see letter dated November 26, 2001, Appendix C, Section 2).

The FHWA and MDOT note that the Preferred Alternative would have an “adverse effect” on cultural resources. To determine effects, the FHWA applies the criteria of adverse effect, as listed in Section 106 of the National Historic Preservation Act. A project results in an adverse effect on an historic property when it diminishes those characteristics that make it historically significant. Activities that may result in an adverse effect include demolition, landscape changes, isolation of a property from its setting, and the introduction of visual, audible or atmospheric elements out of keeping with the character of the property.

Because the Preferred Alternative would adversely affect historic properties, FHWA and MDOT must develop mitigation measures to minimize impacts, should the Preferred Alternative be advanced after the public hearing. FHWA develops these measures in consultation with the SHPO, the community, and the Advisory Council on Historic Preservation in Washington, D.C. Section 6 of this EIS discusses historic properties that could experience an adverse effect.

4.12.1 Historic Architecture

No sites in the APE are already listed on the *National Register*. The nearest such site is the Goodrich Historic District, about 400 feet west of M-15 along West Hegel. *National Register* sites also exist in Ortonville, east of M-15. There would be “no effect” on these sites.

An extensive field survey of all standing structures 50 years or older was conducted, along with literature research and interviews with knowledgeable persons in the corridor (Appendix I) to determine their historic significance and eligibility for listing on the *National Register*. Cultural resource meetings were held November 15, 2000, January 24, 2001, and April 3 and 4, 2001 to inform the public about historic resources and to solicit information about such resources. Consultation was undertaken with the SHPO. As a result, 12 sites are considered potentially eligible for listing on the *National Register* (Table 4-9, Figure 1-3). Four are expected to suffer an adverse effect from the project. Hence, a Memorandum of Agreement (MOA) is necessary and will be included in the FEIS. It will spell out conditions that mitigate impacts to those properties adversely affected. Section 6 of this EIS provides a Draft Section 4(f) Evaluation of those properties that would experience an adverse effect and that would be covered in the MOA. Potentially eligible sites in Table 4-9 with no adverse effects are discussed next. As they suffer no adverse effect, they are not covered in the Section 4(f) Evaluation in Section 6.

The West Ortonville Historic District is centered on Mill and Narrin Streets on land owned by George Narrin, a prominent early resident. The land was sold in parcels larger than in the older parts of the community, providing plenty of space for large Queen Anne style houses. The houses in the district are associated with the initial subdivision and development of the western edge of Ortonville (Criterion A), and they embody the distinctive characteristics of a type, period, or method of construction (Criterion C), specifically the Queen Anne style. The garage of 46 Mill Street is the only structure that would be affected. It was constructed after the residence and

¹⁷ “Phase I Archaeological Survey of the Proposed M-15 Improvement Between I-75 and I-69 Oakland and Genesee Counties, Michigan,” Commonwealth Cultural Resources Group, June 2001, and “Phase I/II Above-Ground Survey of the Proposed M-15 Improvement Between I-75 and I-69 Oakland and Genesee Counties, Michigan,” Commonwealth Cultural Resources Group, October 2001.

Table 4-9
Summary of Project Effects on Potential
National Register Eligible Cultural Resources

Site Name	Location	Description	Eligibility Criteria	Effect
Dawley Residence / Stone Store	850 Ortonville West side M-15 north of Wolfe Road	Former residence, now gift shop with stone pillars in existing right-of-way, circa 1916	C	New right-of-way would be about 40' into yard for wider road.
Ortonville West District	Mill Street, clustered at Narrin Street	Queen Anne style house built on George Narrin's land	A & C	New right-of-way will demolish 46 Mill Street garage.
Michigan Milk Producers Receiving Station	126 N Ortonville Road. East side M-15 N of Myron Street	Example of small Art Moderne style industrial facility	A & C	New right-of-way line would be about 10' from building.
Ortonville Cemetery	West side M-15 south of Oak Wood Road	Cemetery, circa 1840-1940	C	Existing pavement edge would be maintained. No effect on historic portion of cemetery.
Mills Farmstead	610 N Ortonville Road. East side M-15 at Groveland Road	Circa 1860 well preserved farm	A & C	Existing right-of-way line maintained.
J. Westerby Farmstead	1215 N Ortonville Road	Example of popular trend in fieldstone cladding, circa 1880	C	Existing right-of-way line maintained.
Rhodes-Green Farm Historic District	10448 Green Road on West side M-15	Association with an early settler and agriculture, circa 1860/1881	A	New right-of-way would be about 20' to 30' into yard for wider road.
Henry Hawes Residence Historic District	8083 State Street on East side M-15 in Goodrich	Italianate architectural example, circa 1870.	A & C	New right-of-way would be about 30' into front yard, including two large trees.
Kitchen School House	4010 State Road on SW corner M-15 and Bristol	Early school, circa 1870	A & C	Existing right-of-way line maintained.
Freeman Sweers Residence / Louhelen Baha'i Center	3208 State Road. West side M-15 north of Bristol Road	House circa 1885. Retreat founded in 1931 as Baha'i faith school and center	A & C	Existing right-of-way line maintained, but trees may be removed.
Goodenough Townsend Residence	2430 State Road	Example of residential Gabled-Ell architecture, circa 1875	C	New right-of-way would be 20'+ into front yard with smaller trees likely removed, but larger yard trees remaining.
Seelye House	2224 Montague backing up to M-15	Example of residential brick Gabled-Ell architecture, circa 1875	A, B, & C	New right-of-way would be about 30' into back yard.
20OK480	East side M-15 south of Oak Hill Road	Archaeological remains of farmstead	Unknown	Phase II testing required to determine National Register eligibility. New right-of-way would extend over much of site.

Source: Commonwealth Cultural Resources Group

has since been moved such that it is no longer a contributing element to the district. Therefore, the district is not considered to experience an adverse effect with the project.

The Ortonville Cemetery is on M-15 north of Ortonville. It demonstrates integrity of location, design, setting, materials, workmanship, feeling, and association, and is considered eligible for the *National Register* under Criterion C. The edge of pavement would remain where it is today, with widening to the east, away from the cemetery. Therefore, there would be no adverse effect.

The Mills Farmstead (610 North Ortonville Road) is north of the cemetery on the other side of M-15. It is an excellent example of a family farm that has functioned for almost 150 years, and is considered eligible for the *National Register* under Criteria A and C. It has association with events significant in our history, including exploration, settlement, and the practice of agriculture (Criterion A). And, buildings embody the distinctive characteristics of a type, period, or method of construction (Criterion C). Property acquisition was avoided by carrying a very narrow boulevard section past the Mills Farmstead. Therefore, there would be no adverse effect.

The Westerby Farmstead (1215 North Ortonville Road) is on the west side of M-15, several lots south of Auten Road. The house and garage are considered eligible for the *National Register* under Criterion C, as they embody the distinctive characteristics of a type, period, or method of construction (rustic fieldstone wall cladding). No right-of-way would be taken from this property. Therefore, there would be no adverse effect.

The Rhodes-Green Farm Historic District (10448 Green Road) is on the southwest corner of Green Road and M-15. It is considered eligible for the *National Register* as a district under Criterion A, due to its association with early settlement by John and Huldah Rhodes, and its continuing agricultural activities. Two new homes have been built along the frontage of M-15 as sell-offs from the farm, so the Rhodes-Green Farm property has three points of contact with M-15, with the new houses separating the frontages. The new right-of-way would extend about 20 to 30 feet beyond the present right-of-way into the Rhodes-Green Farm Historic District. The Green Road intersection and wetlands at Kearsley Creek control the alignment, and make it imprudent to shift the alignment to the east. Nevertheless, as the farm's boundary has already been changed by the construction of the two new homes on parcels that front onto M-15, the property acquisition from the Rhodes-Green Farm is not considered an adverse effect.

The Kitchen School House (4010 State Road), at the southwest corner of Bristol Road and M-15, is considered eligible for the *National Register* under Criteria A and C, due to its association with events that have made a significant contribution to the broad patterns of our history and the fact that the school building embodies the distinctive characteristics of a type, period, or method of construction. No new right-of-way would be required, so there would be no adverse effect.

The Goodenough Townsend residence is now reduced to approximately 3 acres of an original farmstead of 80 acres, circa 1873. Goodenough Townsend was a prominent citizen of the 1840s and 50s. The residence remains an excellent example of a Gable-El home, circa 1875. Therefore, the residence is considered eligible for inclusion on the *National Register* under Criterion C. Acquiring 20+’ of right-of-way will not adversely affect those characteristics that make this site eligible for the *National Register*. The actual roadway pavement would be approximately 19 feet closer to the house.

The Seelye House faces onto Montague Road (2224 Montague Road). The back of the lot abuts M-15. A shed in back of the house is considered a contributing element. The property's eligibility for the *National Register* falls under Criteria A, B, and C. The shed and home are associated with the broad patterns of history (Criterion A), and the house with a significant person, Abel Seelye, a prominent early settler (Criterion B). The house is also eligible under Criterion C as it is an excellent brick example of a Gabled-El residence. Its brick composition is an expression of the development of the local brick industry initiated as a result of railroad construction in 1871. When driving on M-15, one is not aware of the Seelye House due to screening vegetation, the elevation of the yard above the road (several feet) and the presence of the newer homes on either side of it. Acquiring 20’ of right-of-way will not adversely affect those characteristics that make this site eligible for the *National Register*.

4.12.2 Archaeological Resources

A Phase I archaeological survey was performed in the APE (Appendix J). All recorded sites are well beyond the APE. Most of the area has been previously disturbed, either as roadway right-of-way or yard. Nine archaeological sites potentially affected by project work were identified as a direct result of this fieldwork. Five are historic sites in Oakland County; three are historic sites in Genesee County; and, one is a prehistoric find in Genesee County. Of the nine, eight are not considered eligible for listing in the *National Register*. Site 20OK480 needs further testing to determine its eligibility (Table 4-10). It is the remains of a farmstead located on the east side of M-15. Should the SHPO determine the site meets the eligibility criteria, MDOT will proceed to excavation, recording the information the site has to yield. This site is primarily important for the information it can give about 19th / early 20th century agriculture and not for preservation in place.

4.13 Parkland

No parkland is directly affected. M-15 is Michigan's first Heritage Recreation Route. The designation indicates that M-15 provides access to a number of recreational resources. A mile east of M-15 at Hadley Road is Independence Oaks County Park. One-half mile west of M-15 near Ortonville are sections of the Holly Recreation Area. One mile east of M-15 north of Ortonville are sections of the Ortonville Recreation Area and Hadley Hills Recreation Area. North of Davison are the Genesee Recreation Area and the Holloway Reservoir Regional Park.

4.14 Visual Conditions

In the south corridor, M-15 passes over hills north of Cranberry Lake Drive and Hubbard Road. The terrain is then flat to rolling until a hill south of Seymour Lake Road. M-15 is relatively flat through Goodrich. It then passes over rolling terrain north through Genesee County to I-69. The dominant visual characteristic is large-lot residential uses punctuated by lakes and wetlands, and in Genesee County, rural landscapes, both natural and manmade (farmlands). Commercial strip development occurs near Ortonville and at the north and south ends of Goodrich. Commercial/office uses dominate the visual scene near Lippincott Road in Davison Township. Ortonville and Goodrich influence the setting of the roadway. Ortonville contains a potential *National Register* historic district, but it is off line of M-15. In Goodrich a district is listed on the *National Register*, but it too is off-line. There is newer commercial development to the south of this area on the east side of M-15 and just north of Goodrich.

When improvements to M-15 were proposed in the early 1990s in the form of a five-lane road, those in the corridor expressed a desire for a more aesthetic road - a boulevard. The aesthetic attributes of the boulevard have been recognized to integrate better with the character of the corridor and so the Preferred Alternative mixes five-lane and boulevard cross sections. Where the narrow boulevard "fits" with acceptable impacts, it has been proposed.

4.15 Contaminated Sites

A Project Area Contamination Survey (PACS) was conducted for the M-15 improvement project (Appendix K).¹⁸ The purposes of the PACS were to investigate parcels of property potentially affected by the project for the presence of environmental contamination and to determine whether further investigation or remediation is needed. The assessment for contamination included: field

¹⁸ "Project Area Contamination Survey," The Corradino Group, November 2001.

reconnaissance; interviews with business owners and governmental agency representatives; review of federal and state environmental databases; and, review of historical land use records. The PACS assessed commercial and industrial properties along the corridor. Residential, farm, and institutional properties were not covered unless there were specific observations or reported indications of contamination. Each site was categorized by contamination potential as no, low, or medium/high (Table 4-10 and Figure 4-3). Locations noted as medium/ high are recommended for further investigation. Details of the analysis follow.

Review of federal databases found no listed sites within one mile of the project corridor; i.e., no CERCLIS (Comprehensive Environmental Response, Compensation, and Liability, Information System); NPL (National Priorities List [Superfund]); and, RCRIS-TSDs (Resource Conservation and Recovery Information System hazardous waste Treatment, Storage and Disposal facilities) sites. The Michigan Contaminated Sites list, the equivalent of a state superfund list, contained one site in the corridor known as Mill Street Residential Wells (Ortonville). It involved a contaminated groundwater plume near Mill Street and M-15 in Ortonville. Groundwater depth in this area is less than ten feet in some locations; therefore, contaminated groundwater could be encountered during construction. Other state environmental databases and records reviewed included permitted hazardous waste generators, underground and aboveground storage tank sites, and landfills/solid waste facilities. Twenty-six permitted hazardous waste generators were identified along M-15 within the project corridor. Most of these facilities were registered for disposal of tank sludge and waste liquids generated during the removal of underground storage tanks (USTs) and are not currently generating hazardous wastes.

Seven non-underground storage tank sites were classified as “medium/high” for contamination potential because of their handling of hazardous materials or wastes, and the presence of an on-site septic system. These sites should be tested further for soil and groundwater impacts.

No permitted solid waste/landfill facilities were identified. One former municipal landfill used by Brandon and Independence Townships was reported in interviews with local governmental representatives in a low-lying area of approximately 20 acres on the west side of M-15, approximately one mile north of Oak Hill Road. The landfill site was reportedly acquired by private owners in the late 1960s or early 1970s and the operation ceased. No records regarding this site were available from MDEQ. The proposed project would acquire approximately a 50-foot strip along the eastern edge of this property. A Preliminary Site Investigation (PSI) consisting of soil and groundwater testing should be performed prior to acquisition by MDOT.

By far the most common potential environmental problem for the project is UST sites. There are eight operating gas stations and 19 former gas stations/UST sites along M-15 within the corridor. Twenty-one properties that are within the right-of-way of the proposed project have or had USTs. MDEQ UST records show that there are sixteen registered UST facilities within the corridor. Seven of these were identified as Leaking UST (LUST) sites. Of the seven LUST sites, MDEQ records indicate four are “open” meaning they are being investigated or remediated.

Several of the former gas stations/UST sites closed before 1988, which is when comprehensive federal and state UST regulations went into effect. Because they were not subject to the current UST regulations, there are no public records available for these older sites. Due to the potential for soil and/or groundwater contamination associated with USTs, on-site testing should be performed at all current and former UST sites that are within the project corridor during the PSI.

In total, 31 sites are recommended for further testing including: one dump; seven sites potentially affected by hazardous material handling; and, 23 underground storage tank sites.

**Table 4-10
Contamination Summary**

SID No.	Site Name (Former Name or Use)	Address or Location	City	Records/ Observations							ROW W or A	Contamination Potential Rating	Comment
				CERCLIS/NPL	MI Contam. Sites	LUST	UST	RCRIS (Haz. Waste)	AST	Other*			
1	Mobil Gas Station	1499 S State Rd	Davison				X				A	L	Gas Station
3	Zips Party Store (Zirnhelms County Market)	3355 S State Rd	Davison			X-c	X				W	M/H	Gas Station
5	Vacant Garage, NE corner of Bristol Rd & M-15	Bristol Rd/M-15	Davison							X	W	M/H	Old Gas Station
6	Filled Site, west of M-15, south of Maple Road	Near Maple Rd	Davison							X	W	L	Construction Fill
7	Last Chance Party Store	5545 S State Rd	Davison						X	X	W	M/H	Old Gas Station
9	Burton Industries	6202 S State Rd	Goodrich					X			W	M/H	Haz Materials
10	Burkland Textron	6520 S State Rd	Goodrich					X			W	L	Haz Materials
14	Jan's Sport Marine	7285 S State Rd	Goodrich						X	X	W	L	Haz Materials
19	Kens Ready Mix	8016 S State Rd	Goodrich						X	X	W	L	Haz Materials
22	Church & Sons Auto Center (Kellys Auto Repair)	8039 S State Rd	Goodrich			X-c	X	X	X		W	M/H	Gas Station
23	John's Steak House (Dominic Sirignano)	8038 State Rd	Goodrich			X-o	X	X			W	L	Old Gas Station
24	Quick-Sav Food Stores	10318 Hegel Rd	Goodrich				X	X			W	M/H	Gas Station
25	Vacant Lot, SE corner of Hawes & M-15	Hawes/M-15	Goodrich							X	W	M/H	Old Gas Station
28	Morts Barber Shop/Goodrich Cleaners	8191-93 State Rd	Goodrich							X	W	M/H	Old Gas Station
29	Town Pride Carpet	8217 State Rd	Goodrich							X	W	M/H	Old Gas Station
30	Goodrich Car Care (Oakhill Auto Restoration)	8221-23 S State Rd	Goodrich			X-o	X	X			W	M/H	Old Gas Station
35	Goodrich Mfg. Co.	8267 S State Rd	Goodrich					X		X	A	L	Haz Materials
38	Nu View Auto Glass/Car Wash	8355 State Rd	Goodrich			X-c	X	X			W	M/H	Old Gas Station
39	Goodrich Auto Parts/RJs TV Repair	8359-65 S State Rd	Goodrich								W	L	Haz Materials
40	The Village Greenery	8340 State Rd	Goodrich							X	W	L	Haz Materials
41	Atlas Real Estate (Germaines Corvettes)	8491 State Rd	Goodrich					X			W	L	Haz Materials
44	Vacant Commercial Bldg	Horton Rd & M-15	Goodrich							X	W	M/H	Old Gas Station
45	Bedrock Express	1290 M-15	Ortonville						X	X	W	L	Truck Maintenance

Notes:* Other potential contamination sites identified by reconnaissance and/or interviews.

LUST - Leaking underground storage tank; X-c = Closed case; X-o = Open case.

UST - Underground storage tank AST - Aboveground storage tank

CERCLIS - Comprehensive Environmental Response, Compensation and Liability Information System

RCRIS - Resource Conservation and Recovery Information System

W = Within Right-of-Way, A = Adjacent to Right-of-Way.

Table 4-10

Contamination Summary (Continued)

SID No.	Site Name (Former Name or Use)	Address or Location	City	Records/ Observations							ROW W or A	Contamination Potential Rating	Comment
				CERCLIS/NPL	MI Contam. Sites	LUST	UST	RCRIS (Haz. Waste)	AST	Other*			
47	POH Medical Center (Ortonville Family Medicine)	180 N Ortonville Rd	Ortonville					X			W	L	Haz Materials
48	Recovery Systems Int. (Allflo Products)	160 N Ortonville Rd	Ortonville					X			W	M/H	Haz Materials
49	Engineering Tube Specialties (former dairy)	Ortonville Rd	Ortonville							X	W	M/H	Haz Materials
51	Rite Aid (Waterlock Solvents)	1 Mill Street	Ortonville					X			W	M/H	Old Dry Cleaners
52	Ace Hardware (Waterlock Solvents)	4 N Ortonville Rd.	Ortonville							X	W	M/H	Old Dry Cleaners
53	Marathon Station (CMS/Boron)	15 N Ortonville Rd.	Ortonville			X-o	X	X		X	W	M/H	Gas Station
54	Closed Garage (Futura Collision)	12 M-15	Ortonville					X		X	W	M/H	Haz Mat/Old Gas Sta.
55	Little Caesars (former gas station)	11 S Ortonville Rd	Ortonville					X		X	W	M/H	Old Gas Station
58	Vacant Comm. Bldg.	S Ortonville Rd	Ortonville								W	L	No Comment
60	Simms Chevrolet (Owen Motors, Inc.)	110 S Ortonville Rd	Ortonville				X	X			W	L	Haz Materials
61	C & J Oil Change	150 S Ortonville Rd	Ortonville					X		X	W	L	Haz Materials
63	Hamiltons Propane, Inc.	300 Ortonville Rd	Ortonville						X		W	L	Haz Materials
64	Vacant Commercial Bldg (Bell Auto Parts)	384 Ortonville Rd	Ortonville							X	W	M/H	Haz Materials
70	Country Countertops	490 S Ortonville Rd	Ortonville								W	M/H	Old Gas Station
71	Clark Station	495 S Ortonville Rd	Ortonville				X	X		X	W	M/H	Gas Station
73	Brandon Tire & Auto Center	595 S Ortonville Rd	Ortonville					X			W	M/H	Haz Materials
79	Brandon Family Dentist Office	830 S Ortonville Rd	Ortonville								W	L	Haz Materials
81	Forster Auto Wash	880 S Ortonville Rd	Ortonville							X	W	M/H	Old Gas Station
83	James Lumber Co. (Brandon Building Center, Oxford Lumber)	910 S Ortonville Rd	Ortonville				X				W	M/H	Old UST Site
87	Arrants Ford	968 Ortonville Rd	Ortonville					X		X	A	L	Haz Materials
88	Commercial Site (under construction)	Ortonville Rd	Ortonville				X			X	W	L	New UST Site

Table 4-10

Contamination Summary (Continued)

SID No.	Site Name (Former Name or Use)	Address or Location	City	Records/ Observations							ROW W or A	Contamination Potential Rating	Comment
				CERCLIS/NPL	MI Contam. Sites	LUST	UST	RCRIS (Haz. Waste)	AST	Other*			
91	J & F Collision. Inc.	1342 S Ortonville Rd	Ortonville					X		X	W	M/H	Haz Materials
94	Vacant Commercial (Sunburst Florist & Nursery)	1660 S Ortonville Rd	Ortonville								A	L	Haz Materials
95	Masterack (Eng. Comp Sys/AutoFab, Inc./Autocomp/Legget & Platt)	1695 S Ortonville Rd	Ortonville					X			A	L	Haz Materials
96	Shell Food Mart	1765 S Ortonville Rd	Ortonville			X-o	X			X	A	L	Gas Station
97	Eagle Point Shopping Center (former gas station)	1764-76 S Ortonville Rd	Ortonville							X	W	M/H	Old Gas Station
99	Tri-Mountain Water	1963 S Ortonville Rd	Ortonville							X	A	L	Old Gas Station
101	Alderman Animal Hospital (former gas station)	2140 S Ortonville Rd	Ortonville				X				W	M/H	Old Gas Station
103	Bullfrogs Restaurant	2225 S Ortonville Rd	Ortonville							X	A	L	Old Auto Salvage Yard
104	Mike's Auto Repair (Woody & Rays Marathon)	2200 S Ortonville Rd	Ortonville				X	X			A	L	Old Gas Station
105	Real Estate One (Jim's Auto Parts & Oil Service)	2245 S Ortonville Rd	Ortonville							X	A	L	Old Auto Salvage Yard
106	Former Dump (near Solley's Appliances)	S Ortonville Rd	Clarkston							X	W	M/H	Old Dump
108	Oakhill Auto Parts/MVA Contr/City Press	3960-80 S Ortonville Rd	Clarkston					X		X	W	M/H	Haz Materials
110	And I Do (Oakhill Auto Restoration)	3994 S Ortonville Rd	Ortonville					X		X	W	M/H	Haz Materials
112	Nicolodeon Restaurant	10081 S Ortonville Rd	Ortonville							X	A	L	Old Gas Station
113	Clarkston Citco	7650 S Ortonville Rd	Clarkston				X			X	A	L	Gas Station
124	Mill Street Residential Wells	Mill Street	Ortonville		X						W	M/H	GW Contamination

Source: The Corradino Group

4.16 Soils and Utilities

Organic soils are present at a number of locations in the corridor, especially in wetland areas. The presence of these soils increases project costs as special techniques are required to provide a stable roadbed. Depending on the depth and breadth of these soils, techniques range from total soil removal within the influence of the proposed pavement to partial removal. High-quality geotextile fabrics may be used for additional strength to support the proposed roadway.

Reconstruction of M-15 at the north end of the corridor could affect sections of a sewer line along the west right-of-way line north at Bristol Road. A high-tension electrical line north of County Line Road would not be affected as the towers are well outside the right-of-way. Other effects on utilities would be consistent with normal utility relocations for roadway projects.

4.17 Construction Permits

A permit will be required from the Road Commission for Oakland County to realign the approaches of Glass Road outside of the MDOT right-of-way, as Glass Road is a county road.

There will be permits necessary from the County Drain Office for each of the county drains that are crossed.

Michigan Department of Environmental Quality permits will be required during the design phase for use of wetlands and stormwater discharges. The construction phasing will dictate the number of permits required.

4.18 Secondary and Cumulative Impacts

A number of communities in the corridor expressed interest in controlling growth in interviews conducted for the study. The general trend has been to zone residential areas for large lot development. The lack of sewers has historically limited the density of development, including commercial and industrial uses.

The townships in the corridor have not pursued paving of local and county roads as travel alternatives to M-15 (Independence Township and, to a lesser extent, Davison Township are exceptions). Consequently, M-15 has been and continues to be the focus of growth and travel in the corridor. Tremendous growth in the employment base in Oakland County and a general movement to the outer limits of both Oakland and Genesee counties has resulted in a market for much residential development in the corridor as evidenced by the population growth data shown in Table 1-1.

Widening of M-15 addresses a need already in evidence, not an induced need. There is no indication that land use policies will limit growth to a level that the need for four lanes of through travel on M-15 is eliminated. Growth has and will occur whether or not M-15 is reconstructed. Reconstruction of M-15 keeps roadway development in step with overall development.

If nothing were done to improve M-15, growth will continue to occur. The population of the townships in the project area grew 29 percent over the last ten years with no improvement to M-15. Continued growth will lead to breakdown conditions on M-15 and the entire corridor will be over capacity during peak periods. Increased traffic will be detrimental to community cohesion, if no action is taken.

Improving M-15 will improve air quality by reducing congestion, lessening idling, and smoothing traffic flow. If nothing were done, crashes would increase at a faster rate than if the project were built, estimated at 707 crashes in 2025, compared to 644 with the Preferred Alternative.

4.19 Energy

Energy will be used to construct the project. Fuel savings to motorists should be realized in the long term due to improved traffic flow. Motorists will also be able to maintain more constant traveling speeds, adding to their fuel savings.

4.20 Cost

A construction cost estimate has been prepared based on average unit bid prices and estimated quantities from the engineering analysis. Added to these costs is a 15 percent contingency. Project design and construction management represent a 25 percent add-on to the construction cost. Right-of-way/relocation costs were then added to estimate the project's total cost – \$132.9 million. The costs are presented in Table 4-11 by corridor sector (Figure 1-2).

4.21 The Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

This project is a result of local and regional, as well as statewide comprehensive planning. Present and future traffic needs were considered and are reflected in the proposed project (Appendix A). It is concluded that the local short-term impacts and use of resources by the proposed action are consistent with the maintenance and enhancement of long-term productivity for both the local area and the State of Michigan.

4.22 Irreversible and Irretrievable Commitments of Resources Which Would be Involved in the Proposed Action

Implementation of the proposed action involves a commitment of a range of natural, physical, human, and fiscal resources. Land used for construction of the proposed trunkline is an irreversible commitment of land for a roadway facility.

Considerable amounts of fossil fuels, labor, and highway construction materials such as cement, aggregate, and bituminous material will be expended for this project. Additionally, large amounts

Table 4-11
M-15 Project
Preliminary Cost Estimate

CONSTRUCTION

<u>Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Cost</u>
<u>Sector A1 - Five Lane</u>				
Roadway	3500	LFT	\$550	\$1,930,000
Peat excavation	600	CYD	\$10	\$10,000
Swamp Backfill	600	CYD	\$10	\$10,000
Remove/Replace Sanitary	110	LFT	\$70	\$10,000
Traffic Signals (Four-Way)	1	EACH	\$25,000	\$30,000
Contingency (15%)				\$300,000
Sector Construction Subtotal				\$2,290,000
<u>Sector A2a - Five Lane</u>				
Roadway	13900	LFT	\$550	\$7,650,000
Box Culvert	600	LFT	\$1,000	\$600,000
Peat Excavation	17900	CYD	\$10	\$180,000
Swamp backfill	17900	CYD	\$10	\$180,000
Remove/Replace Sanitary	6050	LFT	\$70	\$420,000
Contingency (15%)				\$1,350,000
Sector Construction Subtotal				\$10,380,000
<u>Sector A2b - Narrow Boulevard</u>				
Roadway	5300	LFT	\$525	\$2,780,000
Storm Sewer	2800	LFT	\$70	\$200,000
Peat Excavation	12800	CYD	\$10	\$130,000
Swamp backfill	12800	CYD	\$10	\$130,000
Contingency (15%)				\$490,000
Sector Construction Subtotal				\$3,730,000
<u>Sector B1 - Narrow Boulevard</u>				
Roadway	11300	LFT	\$525	\$5,930,000
Storm Sewer	6000	LFT	\$70	\$420,000
Box Culvert	140	LFT	\$1,000	\$140,000
Peat excavation	2900	CYD	\$10	\$30,000
Swamp Backfill	2900	CYD	\$10	\$30,000
Remove/Replace Sanitary	300	LFT	\$70	\$20,000
Contingency (15%)				\$990,000
Sector Construction Subtotal				\$7,560,000

Table 4-11 (continued)
M-15 Project
Preliminary Cost Estimate

Sector B2 - Five Lane (Urban)

Roadway (5-Lane)	7700 LFT	\$550	\$4,240,000
Storm Sewer	9800 LFT	\$70	\$690,000
Box Culvert	80 LFT	\$1,000	\$80,000
Peat Excavation	10200 CYD	\$10	\$100,000
Swamp backfill	10200 CYD	\$10	\$100,000
Remove/Replace Sanitary	185 LFT	\$70	\$10,000
Traffic Signal (Four-Way)	1 EACH	\$25,000	\$30,000
Traffic Signal (Three-Way)	1 EACH	\$20,000	\$20,000
Contingency (15%)			\$790,000
Sector Construction Subtotal			\$6,060,000

Sector B3 - Narrow Boulevard

Roadway (Boulevard)	6600 LFT	\$525	\$3,470,000
Storm Sewer	3520 LFT	\$70	\$250,000
Peat Excavation	1000 CYD	\$10	\$10,000
Swamp Backfill	1000 CYD	\$10	\$10,000
Contingency (15%)			\$560,000
Sector Construction Subtotal			\$4,300,000

Sector C1 - Narrow Boulevard

Roadway	9000 LFT	\$525	\$4,730,000
Storm Sewer	4800 LFT	\$70	\$340,000
Peat Excavation	1600 CYD	\$10	\$20,000
Swamp backfill	1600 CYD	\$10	\$20,000
Contingency (15%)			\$770,000
Sector Construction Subtotal			\$5,880,000

Sector C2 - Very Narrow Boulevard

Roadway	3100 LFT	\$525	\$1,630,000
Storm Sewer	3900 LFT	\$70	\$270,000
Box Culvert	100 LFT	\$1,000	\$100,000
Peat excavation	12300 CYD	\$10	\$120,000
Swamp Backfill	12300 CYD	\$10	\$120,000
Contingency (15%)			\$340,000
Sector Construction Subtotal			\$2,580,000

Table 4-11 (continued)
M-15 Project
Preliminary Cost Estimate

Sector D - Narrow Boulevard

Roadway	9500 LFT	\$525	\$4,990,000
Storm Sewer	5100 LFT	\$70	\$360,000
Box Culvert	425 LFT	\$1,000	\$430,000
Peat Excavation	21800 CYD	\$10	\$220,000
Swamp backfill	21800 CYD	\$10	\$220,000
Traffic Signal (Four-Way)	2 EACH	\$25,000	\$50,000
Contingency (15%)			\$940,000

Sector Construction Subtotal			\$7,210,000
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Sector E1 - Five Lane

Roadway	13000 LFT	\$550	\$7,150,000
Additional Earth Excavation	1600 LFT	\$40	\$60,000
Box Culvert	150 LFT	\$1,000	\$150,000
Peat excavation	26700 CYD	\$10	\$270,000
Swamp Backfill	26700 CYD	\$10	\$270,000
Traffic Signals (Four-Way)	1 EACH	\$25,000	\$25,000
Traffic Signals (Three-Way)	1 EACH	\$20,000	\$20,000
Contingency (15%)			\$1,192,000

Sector Construction Subtotal			\$9,137,000
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Sector E2 - Narrow Boulevard

Roadway	6900 LFT	\$525	\$3,620,000
Additional Earth Excavation	875 LFT	\$53	\$50,000
Storm Sewer	3700 LFT	\$70	\$260,000
Peat excavation	14400 CYD	\$10	\$140,000
Swamp Backfill	14400 CYD	\$10	\$140,000
Contingency (15%)			\$630,000

Sector Construction Subtotal			\$4,840,000
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Sector F1 - Boulevard

Roadway (Boulevard)	11000 LFT	\$525	\$5,780,000
Roadway (5-Lane)	600 LFT	\$550	\$330,000
Additional Earth Excavation	1800 LFT	\$53	\$90,000
Keystone Retaining Wall	27000 SFT	\$50	\$1,350,000
Storm Sewer	6600 LFT	\$70	\$460,000
Peat Excavation	8800 CYD	\$10	\$90,000
Swamp backfill	8800 CYD	\$10	\$90,000
Traffic Signal (Four-Way)	4 EACH	\$25,000	\$100,000
Contingency (15%)			\$1,240,000

Sector Construction Subtotal			\$9,530,000
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Table 4-11 (continued)
M-15 Project
Preliminary Cost Estimate

Sector F2a - Very Narrow Boulevard

Roadway	1900 LFT	\$525	\$1,000,000
Additional Earth Excavation	1300 LFT	\$53	\$70,000
Keystone Retaining Wall	39000 SFT	\$50	\$1,950,000
Storm Sewer	2400 LFT	\$70	\$170,000
Traffic Signals (Three-Way)	2 EACH	\$20,000	\$40,000
Remove/Replace Path	140 LFT	\$50	\$10,000
Contingency (15%)			\$490,000

Sector Construction Subtotal **\$3,730,000**

Sector F2a - Five Lane

Roadway	1200 LFT	\$700	\$840,000
Traffic Signals (Four-Way)	1 EACH	\$25,000	\$30,000
Remove/Replace Water Main	1420 LFT	\$75	\$110,000
Contingency (15%)			\$150,000

Sector Construction Subtotal **\$1,130,000**

GRAND TOTAL CONSTRUCTION COST: **\$78,360,000**

GRAND TOTAL CONSTRUCTION COST: **\$78,360,000**

DESIGN & CONSTRUCT. MAN. (25 % of construction) **\$19,590,000**

RIGHT-OF-WAY (Including contingencies) **\$34,900,000**

TOTAL ESTIMATED PROJECT COST **\$132,850,000**

*Assumed a depth of 5' on all Peat Excavation and Swamp Backfill quantities.

**Assumed all through intersections would have 2 traffic signals.

***Additional Earth Excavation and Keystone Retaining Walls are used in areas of large vertical relief.

of labor and natural resources will be used in the fabrication and preparation of construction materials. However, these materials are not in short supply, and their use will not have an adverse effect upon continued availability of these resources.

Construction of this project will require a substantial expenditure of state, federal, and local funds. The commitment of these resources will result in an improved transportation system, providing improved accessibility and safety, and savings in time. These are anticipated to outweigh the commitment of these resources.